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Comparative Anatomy of Reproductive System of Some Species of Semisulcospira (Mesogasrtropoda: Pleuroceridae) from Japan and South Korea

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The ovoviviparous freshwater molluscs of the genus Semisulcospira Boettger, 1886 belonging superfamily Cerithioidea Ferrussuc, 1819 are widely distributed in streams, rivers, ponds and lakes of East Asia including Japan. The cerithioideans are well known as prosobranchs having very similar shell morphology. That is why identification of representatives of the group is very difficult and needs not only genetic [Davis, 1969; Urabe, 1998] but anatomical data also. The literature data on reproductive anatomy of the genus Semisulcospira are contradictory and deficient [Itagaki, 1960; Nakano & Nishiwaki, 1989]. In the connection with that fact the reproductive system of four species Semisulcospira from Japan and South Korea were studied.

Specimens of S. kurodai (Boettger, 1886) (Fig.1A) from the small lake in the south-western part of Hokkaido, S. reiniana (Gould, 1859) (Fig.1B) from the Chiba Lake (Honshu, Japan), S.sp. (Fig.1C) colleced from stream in Saga prefecture (Kyushu, Japan) and specimens of S. decussata (Martens, 1886) from small river of Korean Peninsula (Chungchongnam province, South Korea) are examined. To study the morphology of the pallial oviduct mantle cavity of ethanol fixed specimens was dissected and examined under MBS light microscope. For anatomical and histological study the pallial portion of the reproductive system was brought through a percentage series of ethanol to 100 %, sectioned at 5-7 microns and stained with hematoxylin and eosin. Prepared sections were examined under Olympus microscope. The results of our study are described below.

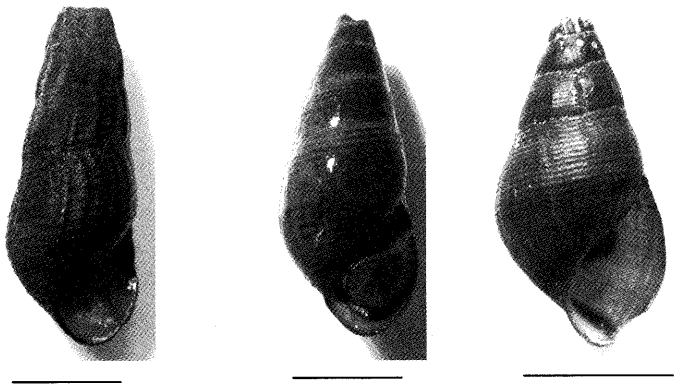

Figure 1. Shell morphology: A – S. kurodai, B - S. reiniana, C - S. sp. Scale bar: 1 sm

The pallial gonoduct of the genus Semisulcospira is presented by medial and lateral laminae, with inter lamellar cavity between these. Inter lamellar cavity is widely opened into mantle cavity and close proximally only. The lateral lamina include brood pouch with embryos. Molluscs of all species, S. kurodai, S. reiniana, S. sp. and S. decussata have medial lamina consisting of seminal receptacle and pallial pocket covered connective tissue. We recognize first organ as a structure filled by oriented spermatozoa along the falls, while pallial pocket contains disintegrated spermatozoa inside. All studied species have similar structure of lateral laminae. Its proximal part has special histological structure called as "proximal portion of lateral lamina". The cells of the structure are stained dark with hematoxylin strongly like that found by Nakano and Nishiwaki (1989). In spite of coloration containing of the cells of proximal portion of lateral lamina has no mucus.

Significantly differences in the shape and position of the seminal receptacle of the S. kurodai, S. reiniana, S.sp and S. decussata were revealed. The seminal receptacle of S.kurodai is located under pallial pocket (Fig.2A), closer to inner part of medial lamina, while the seminal receptacle of S. reiniana (Fig.2B) and Korean Semisulcospira is located on the right side of pallial pocket. Moreover, seminal receptacle of S. forticosta has several protrusions in its proximal part [Prozorova, Raschepkina, 2005]. Seminal receptacle of S.sp located very low, on the sections through proximal part of oviduct we observed only pallial pocket (Fig.2C). The opening of seminal receptacle of S.reinana situated high, we

observed sperm gutter on the section through proximal part of oviduct (Fig.2A), but other studied species have the opening of seminal receptacle into close part of inter lamellar cavity.

Studied species have the pallial pocket of similar structure. It is represented by the tube with muscle walls contains disintegrated spermatozoa inside and sperm gutter along external side of pallial pocket going to seminal receptacle (Fig.2A). The seminal receptacle of S.reiniana, S. kurodai and S.sp. is located under pallial pocket from its left side. So sperm gutter is displaced from right side in the distal part of pallial pocket to its left side in proximal part. Sperm gutter of S. decussata takes place on the right side of pallial pocket.

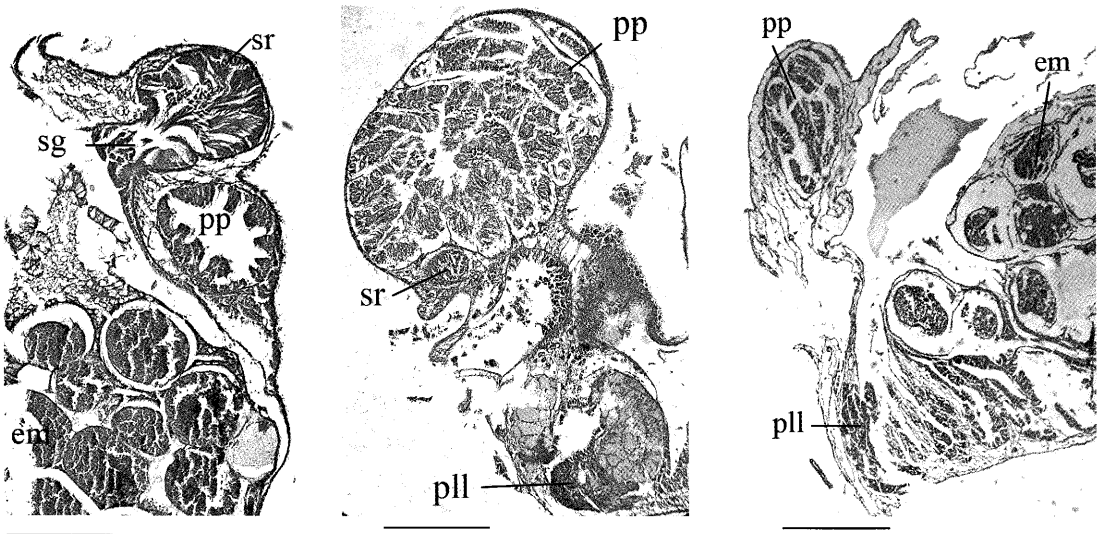

Figure 2. Sections through proximal part of pallial oviduct: A- Semisulcospira reiniana; B- S. kurodai; C- S.sp. Abbriviations: em – embryo, pll – proximal portion of lateral lamina, pp – pallial pocket, sg – sperm gutter. Scale bar: 1 mm

On the basis of our study of reproductive anatomy of freshwater Cerithioidea we regards the differences in position and shape of seminal receptacle are inter-species anatomical differences between S. kurodai, S. reiniana, S.sp from one side and S. decussata from other side. Presence of proximal portion of lateral lamina is probably genetic characteristic of the genus Semisulcospira, belonging to the subfamily Semisulcospirinae Morrison, 1952 of the superfamily Cerithioidea.

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